



EFFECT OF ULTRASOUND THERAPY AND MAITLAND MOBILIZATIONS ON PAIN, RANGE OF MOTION, FUNCTIONAL DISABILITY AMONG SUBJECTS WITH ADHESIVE CAPSULITIS

Physiotherapy

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ABSTRACT

Background: Adhesive capsulitis (frozen shoulder) is a disabling condition characterized by progressive pain, stiffness, and limited range of motion (ROM) of the glenohumeral joint. It commonly affects individuals between 40–60 years and is particularly prevalent among people with diabetes mellitus. Conservative physiotherapy management includes electrotherapy, exercise, and manual mobilizations. Ultrasound therapy and Maitland mobilization techniques are widely practiced, yet evidence supporting their combined effectiveness is limited. **Objective:** To evaluate the effect of Maitland mobilizations and ultrasound therapy on pain, ROM, and functional disability in patients with adhesive capsulitis. **Methods:** Thirty subjects aged above 30 years, diagnosed with adhesive capsulitis, were included in this pre–post experimental study. Participants received Maitland mobilizations along with ultrasound therapy and prescribed home exercises for 4 weeks (12 sessions). Pain and disability were measured using the Shoulder Pain and Disability Index (SPADI), while ROM was assessed using a universal goniometer. Pre- and post-intervention data were compared using paired t-tests. **Results:** Significant improvements ($p < 0.001$) were observed across all outcome measures. SPADI scores reduced from 79.89% to 34.46%. ROM improved markedly in shoulder flexion (91° to 166.9°), abduction (89.7° to 166.5°), and external rotation (14.6° to 36.8°). **Conclusion:** Maitland mobilizations combined with ultrasound therapy significantly reduced pain, improved ROM, and decreased functional disability in adhesive capsulitis. The combined approach is recommended as an effective physiotherapy intervention.

KEYWORDS

Adhesive capsulitis, Maitland mobilization, Ultrasound therapy, Shoulder ROM, SPADI.

INTRODUCTION

Adhesive capsulitis, commonly known as frozen shoulder, is a painful and disabling musculoskeletal disorder involving the glenohumeral joint capsule⁽¹⁾. It is characterized by inflammation, capsular fibrosis, and progressive contracture, leading to pain, stiffness, and restricted movement^(2,3). The condition often follows three clinical stages: a painful stage, a stiffening (frozen) stage, and a thawing stage. While adhesive capsulitis is usually self-limiting, symptoms may persist for 2–3 years, and some patients fail to regain full functional recovery⁽⁴⁾.

The prevalence of adhesive capsulitis is estimated at 2–5% in the general population and up to 20% among individuals with diabetes mellitus^(5,6). It typically affects individuals between 40 and 60 years of age, with a higher incidence in women⁽⁷⁾. Risk factors include diabetes, thyroid disorders, immobilization, trauma, and cardiovascular disease^(8,9).

Conservative management is the first line of treatment. Physiotherapy modalities such as moist heat, shortwave diathermy, interferential therapy, ultrasound therapy, and transcutaneous electrical nerve stimulation (TENS) are frequently used⁽¹⁰⁾. Exercise therapy, stretching, and manual therapy techniques are also essential in management.

Among manual therapies, Maitland mobilizations are particularly effective in addressing joint hypomobility through graded oscillatory movements that target both pain and stiffness^(11,12). Ultrasound therapy works by thermal and non-thermal effects, enhancing tissue extensibility, reducing inflammation, and promoting healing^(13,14,15). Combining ultrasound with Maitland mobilizations has the potential to enhance clinical outcomes, but limited evidence exists^(16,17). This study was designed to evaluate the effectiveness of this combined protocol on pain, ROM, and functional disability in patients with adhesive capsulitis.

METHODOLOGY

Study Design

A single-group pre–post experimental study was conducted at the College of Physiotherapy, SVIMS University, Tirupati. Ethical clearance was obtained with IEC. NO., 1783 from the institutional ethics committee, and informed consent was collected from all participants.

Participants

Thirty subjects above the age of 30 years diagnosed with adhesive capsulitis were recruited. Inclusion criteria were: pain and stiffness of the shoulder without major trauma, diabetes-related adhesive capsulitis, and willingness to participate. Exclusion criteria included history of major shoulder trauma, rheumatoid arthritis, rotator cuff lesions, infections, malignancies, or prior shoulder surgery.

Intervention

Participants underwent 12 treatment sessions over 4 weeks (3 sessions per week). Each session consisted of:

- **Maitland Mobilizations:** Grades I–II were applied in high-irritability cases for pain relief, while Grades III–IV were used in low-irritability stages to improve joint stiffness. Techniques included lateral distraction, anterior, posterior, and inferior glides, as well as end-range mobilizations with stretching.
- **Ultrasound Therapy:** Applied at 3 MHz frequency, 1.5 W/cm² intensity, continuous mode for 8 minutes per session.



Figure 1: Maitland Mobilizations for Shoulder Joint.

- **Home Exercises:** Codman's pendular exercises, wall slides, finger ladder, stick exercises, rope and pulley, and scapular stabilization activities.

Outcome Measures

- **Pain and Functional Disability:** Assessed using SPADI (Shoulder Pain and Disability Index).
- **Range of Motion:** Measured with a universal goniometer for flexion, abduction, and external rotation.

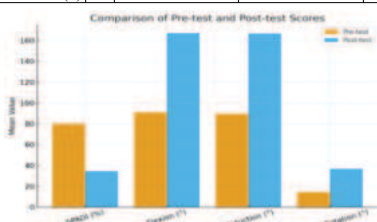
Baseline and post-treatment values were recorded and analysed using paired t-tests.

RESULTS

The study demonstrated statistically significant improvements across all outcome measures ($p < 0.001$).

Table1: It Represents the Pre & Post Values of Spadi Score and Range of Motion

PARAMETER	N	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	t-value	p-value
SPADI (%)	30	79.89 $\pm$ 4.53	34.46 $\pm$ 7.40	39.145	0.001
Shoulder Flexion ($^{\circ}$)	30	91.0 $\pm$ 10.14	166.93 $\pm$ 9.35	49.493	0.001
Shoulder Abduction ($^{\circ}$)	30	89.67 $\pm$ 10.08	166.50 $\pm$ 9.33	40.808	0.001
External Rotation ($^{\circ}$)	30	14.60 $\pm$ 3.99	36.80 $\pm$ 9.51	15.123	0.001



Graph1: It Represents the Pre and Post Values of Spadi Score and Range of Motion of Shoulder Joint

These findings confirm that the combined intervention significantly improved shoulder function within just 4 weeks of therapy.

DISCUSSION

The present study highlights the efficacy of combining Maitland mobilizations and ultrasound therapy in managing adhesive capsulitis. Mobilizations work by stretching the joint capsule, breaking adhesions, stimulating synovial fluid circulation, and modulating pain through mechanoreceptor stimulation^(9,12,16). This reduces protective muscle spasm and enhances proprioceptive input, thereby improving ROM and function.

Ultrasound therapy complements these effects by increasing tissue extensibility, reducing inflammation, and enhancing collagen elasticity^(10,14,15). Thermal effects promote circulation and relaxation, while non-thermal effects facilitate cellular repair. When applied before mobilizations, ultrasound may "prime" the tissues, allowing greater gains during mobilization⁽¹⁷⁾.

Furthermore, the integration of ultrasound therapy with Maitland mobilizations creates a synergistic therapeutic effect. Ultrasound, by priming the tissues through its thermal and non-thermal actions, makes the subsequent mobilization techniques more effective. Patients experience not only faster pain relief but also greater improvement in functional mobility, which is crucial for activities of daily living. This is especially important for individuals with adhesive capsulitis, where limitations in reaching overhead, dressing, or grooming can severely affect quality of life.

Another important implication of this study is the practical application in clinical physiotherapy. Since both ultrasound and Maitland mobilizations are widely available and relatively inexpensive techniques, their combined use can be easily implemented in routine physiotherapy practice, even in resource-limited settings. Moreover, adherence to home exercise programs played a complementary role in sustaining the gains achieved during therapy sessions. This suggests that patient education and engagement remain critical components of successful rehabilitation.

Although the present study was limited by a small sample size and lack

of long-term follow-up, the short-term outcomes are encouraging. Expanding this research to larger populations and including comparative groups could further establish the superiority of the combined approach over single interventions.

The observed improvements in SPADI, ROM, and pain scores align with previous studies that support manual therapy and ultrasound as effective interventions in adhesive capsulitis. Comparable results have been reported by Smita Bhimrao et al. (2014), Singh et al. (2022), and Sharma et al. (2021)^(10,17), who demonstrated that adding mobilizations or ultrasound to conventional therapy yielded superior functional outcomes.

CONCLUSION

In conclusion, the present findings not only add to the growing evidence base on adhesive capsulitis management but also emphasize the importance of a multimodal strategy. By addressing pain, stiffness, and functional limitations simultaneously, this combined intervention provides holistic benefits. Clinicians are therefore encouraged to adopt this evidence-based approach, while future studies should continue to refine and validate optimal treatment protocols.

This study demonstrated that Maitland mobilizations combined with ultrasound therapy significantly reduce pain, improve ROM, and enhance functional outcomes in adhesive capsulitis. The protocol is safe, effective, and feasible for clinical application.

Limitations

- Small sample size.
- Short study duration.
- Lack of long-term follow-up.

Recommendations

Future studies should involve larger randomized controlled trials, include long-term follow-up, and compare this combined protocol with other physiotherapy techniques to establish stronger evidence.

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